

Appl. No.: 09/523,446  
Amdt. dated June \_\_, 2004  
Reply to Office action of April 06, 2004

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**Amendments to the Claims:**

This listing of claims will replace all prior versions, and listings, of claims in the application:

**Listing of Claims:**

1. (Canceled).

2. (Currently amended) ~~A method as in claim 27~~ A method for detecting telecommunication fraud performed in a data processing system having a data warehouse and an OLAP server, the method comprising:

retrieving a plurality of call records from the data warehouse;

generating a calling profile cube based on the call records; wherein the

calling profile cube includes information on multiple customers;

generating a volume-based calling pattern cube for each individual

customer based on the multi-customer calling profile cube;

comparing the volume-based calling pattern cube for each customer to a

predetermined fraudulent volume-based calling pattern; and

when the volume-based calling pattern cube is in a first predetermined

relationship with predetermined fraudulent volume-based calling

pattern, performing a first action.

wherein said data warehouse has a call table and a profile table[,] and

wherein the step of generating a calling profile cube based on the records further comprises the steps of:

retrieving records from the call table and based thereon generating a snapshot cube representing the records from the call table, said snapshot cube having predetermined dimensions;

retrieving records from the profile table and based thereon generating a profile cube representing the records from the profile table, said profile cube having predetermined dimensions that are the same as the dimensions of the snapshot cube;

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merging the snapshot cube and the profile cube to generate an updated profile cube; and

deriving the volume-based calling pattern cubes based on the updated profile cube.

3. (Previously presented) ~~A method as in claim 27A~~ method for detecting telecommunication fraud performed in a data processing system having a data warehouse and an OLAP server, the method comprising:

retrieving a plurality of call records from the data warehouse;

generating a calling profile cube based on the call records; wherein the

calling profile cube includes information on multiple customers;

generating a volume-based calling pattern cube for each individual

customer based on the multi-customer calling profile cube;

comparing the volume-based calling pattern cube for each customer to a

predetermined fraudulent volume-based calling pattern; and

when the volume-based calling pattern cube is in a first predetermined relationship with predetermined fraudulent volume-based calling pattern,

performing a first action,

wherein the step of when the volume-based calling pattern cube is in a first predetermined relationship with predetermined fraudulent volume-based calling pattern; performing a first action includes one of:

flagging a particular caller with the volume-based calling pattern being analyzed as suspicious;

automatically generating an alert that specifies callers with suspicious volume-based calling pattern;

performing further investigation on callers with suspicious volume-based calling pattern;

cancellation of telephone services for callers with suspicious volume-based calling pattern; and

performing other appropriate remedial actions.

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4-5. Canceled.

6. (Currently amended) ~~A method as in claim 27~~ A method for detecting telecommunication fraud performed in a data processing system having a data warehouse and an OLAP server, the method comprising:

retrieving a plurality of call records from the data warehouse;  
generating a calling profile cube based on the call records; wherein the  
calling profile cube includes information on multiple customers;  
generating a volume-based calling pattern cube for each individual  
customer based on the multi-customer calling profile cube;  
comparing the volume-based calling pattern cube for each customer to a  
predetermined fraudulent volume-based calling pattern; and  
when the volume-based calling pattern cube is in a first predetermined  
relationship with predetermined fraudulent volume-based calling pattern,  
performing a first action.

wherein the predetermined fraudulent volume-based calling pattern in one of a personalized calling pattern and a group-based pattern.

7. (Previously presented) A method as in claim 2 further comprising:  
storing the updated profile cube into the profile table in the data warehouse; and

performing data staging between the profile table and the updated profile cube at predetermined time intervals.

8. (Previously presented) A method as in claim 2 wherein said profile cube, snapshot cube, and updated profile cube each includes at least two dimensions and at least two levels.

9. (Previously presented) A method as in claim 8 further comprising:  
analyzing the calling pattern cube by utilizing at least one OLAP operation along more than one level.

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10. (Previously presented) A method as in claim 8 further comprising:  
analyzing the calling pattern cube by utilizing at least one OLAP operation  
along more than one dimension.
11. (Previously presented) A method as in claim 2 wherein the profile cube,  
snapshot cube, and the updated profile cube each are multi-level and multi-  
dimensional cubes.
12. (Previously presented) A method as in claim 2 wherein the profile table  
and the call table each has a plurality of attributes, and the profile cube and  
snapshot cube each has a plurality of dimensions, said attributes corresponding  
in a one-to-one fashion to the dimensions.
13. (Previously presented) A method as in claim 2 wherein the profile cube  
includes at least one cell having probability based values.
14. (Previously presented) A data processing system comprising:  
a data warehouse for storing data in a relational format, said data  
warehouse including a profile table and a call table;  
an OLAP server, coupled to the data warehouse, for providing  
predetermined OLAP operations; and  
a profile engine, coupled to the data warehouse for computing, maintaining  
and utilizing caller pattern cubes that represent caller profiles; wherein the caller  
pattern cubes can be utilized to detect telecommunication fraud.
15. (Currently amended) ~~A data processing system as in claim 14 further~~  
~~comprising:~~ A data processing system comprising:  
a data warehouse for storing data in a relational format, said data  
warehouse including a profile table and a call table;

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an OLAP server, coupled to the data warehouse, for providing predetermined OLAP operations;

a profile engine, coupled to the data warehouse for computing, maintaining and utilizing caller pattern cubes that represent caller profiles; wherein the caller pattern cubes can be utilized to detect telecommunication fraud; and

a fraud detection module for detecting telecommunication fraud by comparing known fraudulent profiles to caller pattern cubes;

the profile engine further generating a profile cube from information selected from the profile table, generating a snapshot cube, updating the profile cube by merging the profile cube and the snapshot cube to generate an updated profile cube, and deriving a calling pattern cube based on the updated profile cube; wherein the profile engine is a scalable computation engine that is implemented by OLAP programming supported by the OLAP server.

16-28. Canceled.

29. (Previously presented) ~~A method as in claim 28~~ A method for detecting telecommunication fraud performed in a data processing system having a data warehouse and an OLAP server, the method comprising:

retrieving a plurality of call records from the data warehouse;

generating a calling profile cube based on the call records; wherein the calling profile cube includes information on multiple customers;

generating a volume-based calling pattern cube for each individual customer based on the multi-customer calling profile cube;

generating a probability-based calling pattern cube based on the volume-based calling pattern cube for each individual customer;

comparing the probability-based calling pattern cube for each customer to a predetermined fraudulent probability-based calling pattern;

when the probability-based calling pattern cube is in a first predetermined relationship with predetermined fraudulent probability-based calling pattern, performing a first action.

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~~wherein the step of when the probability-based calling pattern cube is in a first predetermined relationship with predetermined fraudulent probability-based calling pattern, performing a first action includes one of:~~

flagging a particular caller with the probability-based calling pattern being analyzed as suspicious;  
automatically generating an alert that specifies callers with suspicious probability-based calling pattern;  
performing further investigation on callers with suspicious probability-based calling pattern;  
cancellation of telephone services for callers with suspicious probability-based calling pattern; and  
performing other appropriate remedial actions.

30. (Previously presented) The method of claim 29 wherein the probability-based calling patterns enables one of the analysis and comparison of a first probability-based calling patterns that covers a first time period with a second probability-based calling patterns that covers a second time period.

31-35. Canceled.